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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,165	07/24/2003	Thomas Laursen	004.0033	2527
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			EXAMINER	
			SMITH, NICHOLAS A	
		ART UNIT	PAPER NUMBER	
		1795		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/627,165	Applicant(s) LAURSEN ET AL.	
	Examiner Nicholas A. Smith	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-11 and 13-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-11 and 13-21 is/are rejected.
- 7) ☒ Claim(s) 3-5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. The object of claim 4 and now cancelled claim 12 has been withdrawn.
However, upon further view, claims 3-5 contain "the step of chemical mechanical planarizing" to which there is no antecedent basis and are thusly objected to. Applicant is advised that previous language of cancelled claim 2 could be incorporated into claim 1 to give proper antecedent basis.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, 6-11, 13, 14, and 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable under Basol et al. (US 7,172,497 B2) in view of Hsu et al. (US 2003/0040188).
4. In regards to claims 1, 6-11, 13 and 16-20, Basol et al. discloses a method of planarizing a semiconductor surface comprising a field region of low k dielectric material and a plurality of features each including a feature cavity (Figs. 2-5B; col.4, lines 10-38, col. 5, line 36 to col. 6, line 47), forming a barrier layer overlying at least the field region, forming a first seed layer, electrodepositing a layer comprising copper having a substantially planar upper surface overlying the barrier layer and filling the features in

the insulating layer at least a majority of each feature cavity wherein the layer has the claimed thickness, polishing the layer comprising copper and the barrier layer to remove the layer comprising copper and the barrier layer from the field region using a standard chemical mechanical polishing technique (CMP) with a pad with an abrasive slurry using only one pad and producing a substantially planar surface, a multi-platen apparatus with robotics used to move workpieces in the claimed method, and cleaning and buffing on a single platen as well as polishing the insulating layer.

5. In regards to claim(s) 1, 3, 13-14 and 17, Basol et al. does not explicitly disclose the use of the claimed soft pad or wherein CMP comprises electrochemical mechanical polishing.

6. Hsu et al. pertains to the planarization of metal interconnect features. Hsu et al. discloses the use of a single soft polishing pad in electrochemical mechanical polishing or chemical mechanical polishing process (paragraph [0064] and [0077]). While Hsu et al. does not specifically disclose the claimed range on the hardness scale for a soft polishing pad, since Hsu et al. discloses the same supplier and trade name as defined in the instant specification (paragraph [0023]), the same products (pads) would have substantially the same properties. It would have been obvious to one of ordinary skill in the art to modify Basol et al.'s method of planarization with the use of Hsu et al.'s specific soft pad because Hsu et al. teaches such pads are conventional to have a smooth polishing surface (Hsu et al., paragraph [0064]). Furthermore, it would have been obvious to one of ordinary skill in the art to modify Basol et al.'s step of CMP with Hsu et al.'s step of electrochemical mechanical polishing because Hsu et al. teaches

that such ECMP is a suitable process for planarizing a substrate and minimizing dishing (Hsu et al., paragraphs [0025], [0028], [0077]).

7. In regards to claim 21, Basol et al. does not explicitly disclose the claimed pressure range applied.

8. Hsu et al. teaches a pressure applied range (paragraph [0143]) that substantially overlaps the claimed pressure range and therefore a prima facie case of obviousness is established. See MPEP 2144.05. It would have been obvious to one of ordinary skill in the art to apply the pressure range of Hsu et al. to Basol et al.'s process because Hsu et al. teaches that such pressure effect mechanical activity for polishing (Hsu et al., paragraph [0143]). Furthermore, it would have been obvious to one of ordinary skill in the art to select the claimed pressure range from the broader prior art range because prior art teaches the same utility over the entire range.

9. Claims 4-5 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Basol et al. in view of Hsu et al., and in view of Mahulikar et al. (US Patent 6,776,696).

10. In regards to claim 4, Basol et al. in view of Hsu et al. do not disclose a process wherein there is a presence of a polishing slurry has a copper:barrier layer selectivity of substantially 1:1.

11. Mahulikar et al. teaches a process wherein there is a presence of a polishing slurry has a copper:barrier layer selectivity of substantially 1:1 (col. 2, lines 49-51). It would have been obvious to one of ordinary skill in the art to apply Mahulikar et al.'s

slurry to Basol et al. in view of Hsu et al.'s process in order to get the best topography (Mahulikar et al., col. 2, lines 49-51).

12. In regards to claims 5 and 15, Basol et al. in view of Hsu et al. do not disclose a process wherein there is a presence of a polishing slurry has a copper:barrier layer selectivity of substantially greater than 1:1.

13. Mahulikar et al. teaches the use of two separate slurries on a single platen with the claimed slurry selectivities (col. 2, lines 49-51, col. 3, line 40 to col. 4, line 5, col. 5, lines 38-45). It would have been obvious to one of ordinary skill in the art to apply Mahulikar et al.'s two slurries to Basol et al. in view of Hsu et al.'s process in order to save processing time (Mahulikar et al., col. 5, lines 14-18).

Response to Arguments

14. Applicant's arguments and amendments, see instant claims and remarks, filed 2 November 2007, with respect to the rejection(s) of the claim(s) Hsu et al. have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Basol et al. (US 7,172,497 B2) as stated above.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

16. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas A. Smith whose telephone number is (571)-272-8760. The examiner can normally be reached on 8:30 AM to 5:00 PM, Monday through Friday.

18. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on (571)-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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19. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry D. Wilkins, III/
Harry D. Wilkins, III
Primary Examiner
Art Unit 1795

NAS